TECHNOLOGY DEPT.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLIX
No. 1272

SATURDAY, NOVEMBER 13, 1943
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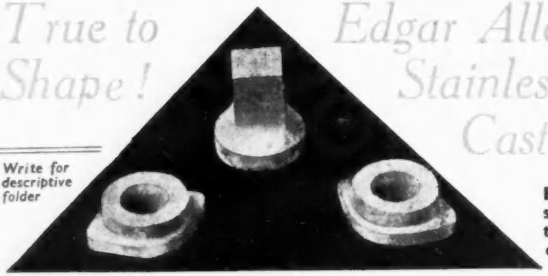

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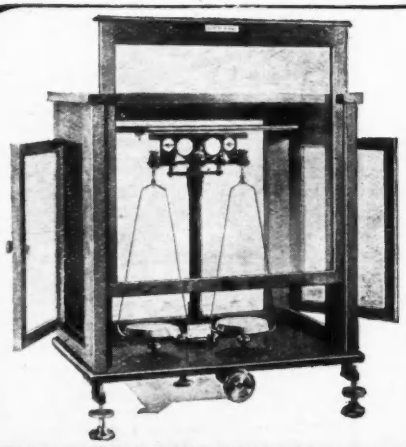

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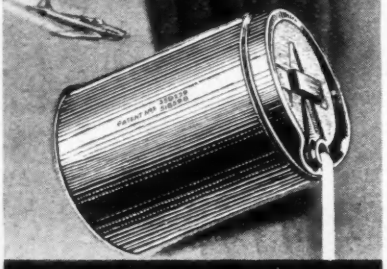

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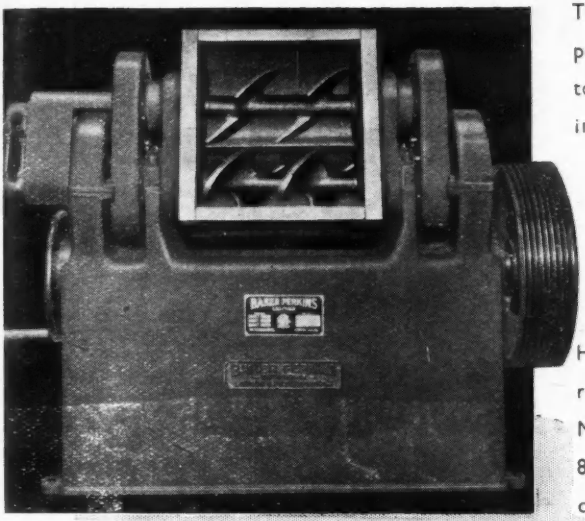

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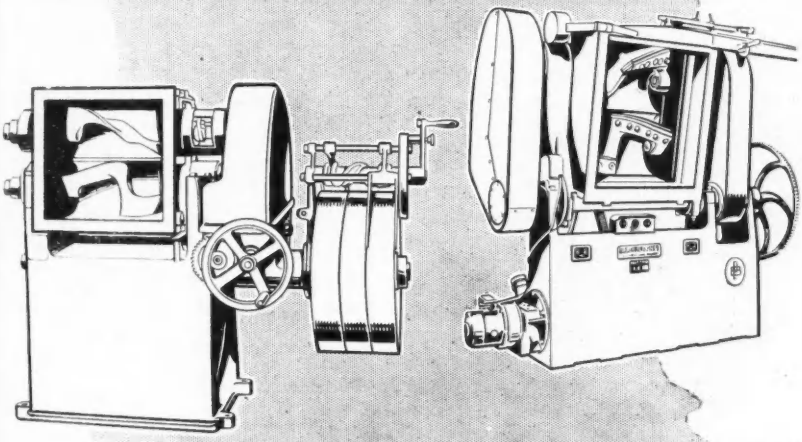

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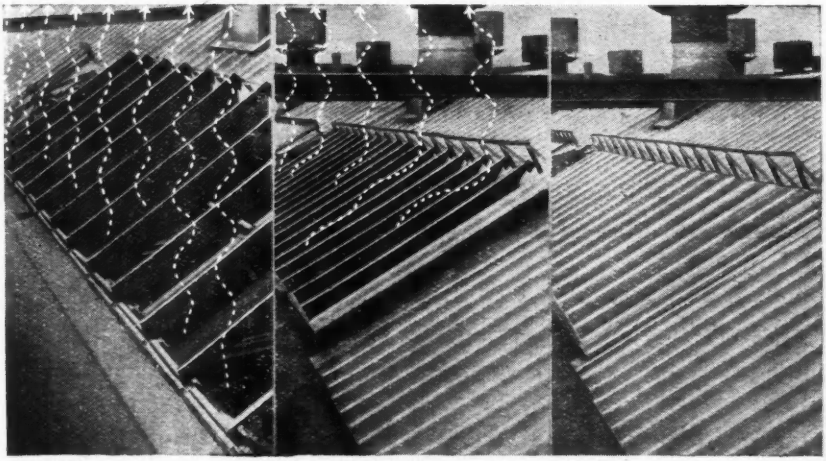

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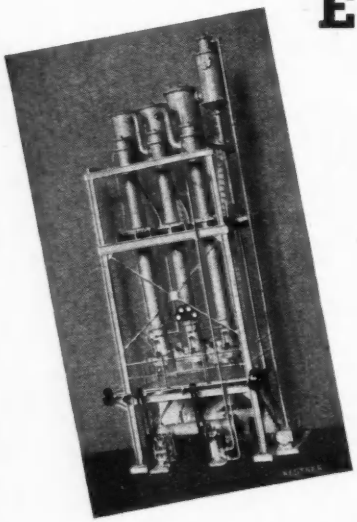

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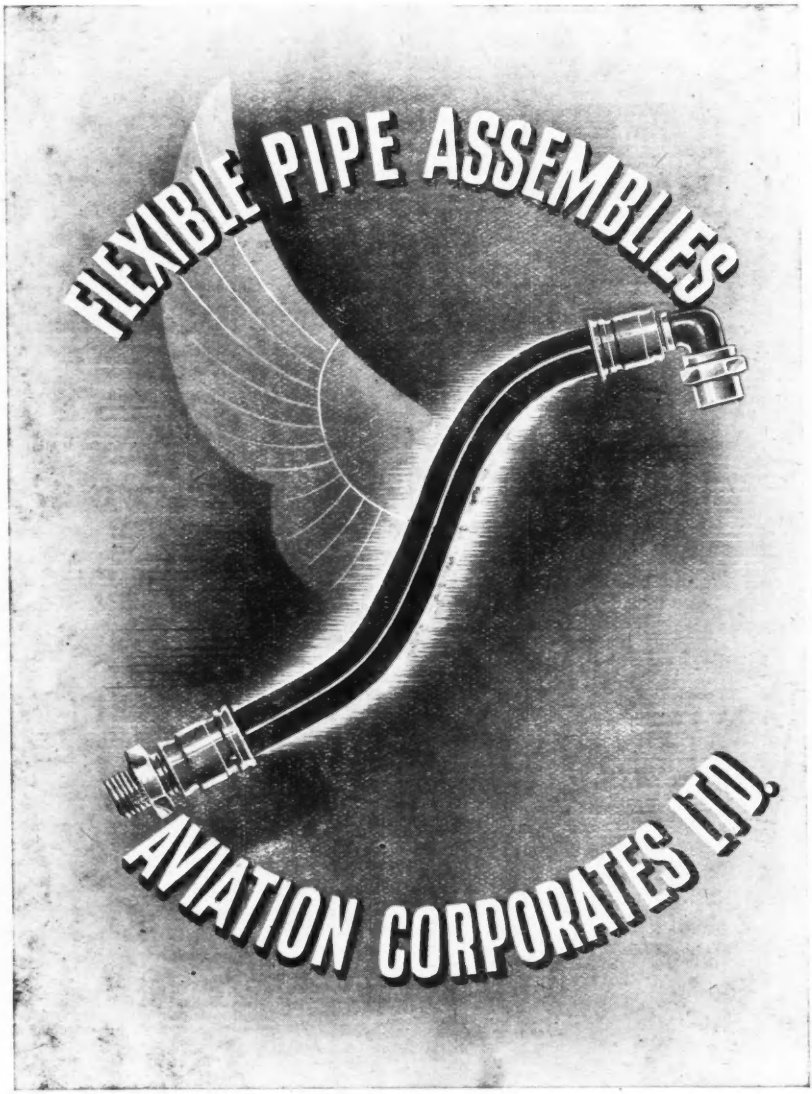

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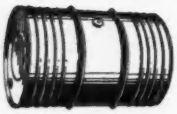

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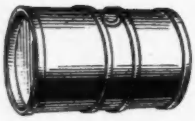

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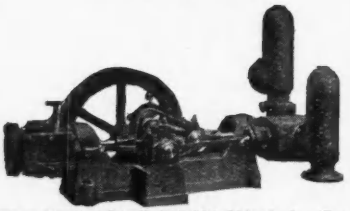

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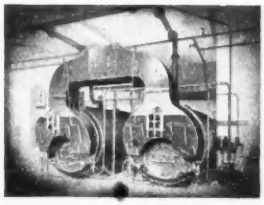

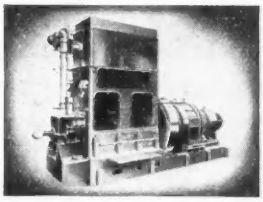

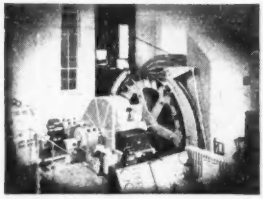

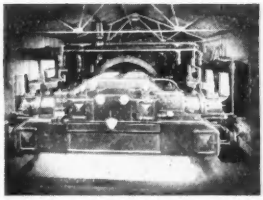

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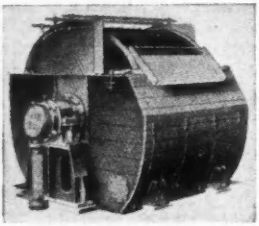

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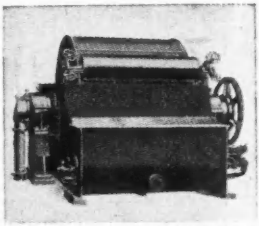

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VOL. XLIX
No. 1272

November 13, 1943

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Reorganising an Industry

THE gas industry is generally regarded in part as essentially a chemical industry. Its manufacturing processes are chemical in character; the production and working up of the by-products are also undeniable chemical industries. The distribution and utilisation of gas and coke provide the non-chemical side of the gas industry, though they are a branch of the wider subject of fuel technology, the best training for which is frequently held to be a course in chemical engineering. The recently-issued report of the British Gas Federation on the Planning of the Gas Industry will thus provide for the chemical industry an interesting object-lesson of the manner in which a closely parallel industry proposes to organise itself to meet post-war conditions.

The gas industry is a composite body of self-governing concerns, comprising 669 statutory undertakings making over 98 per cent. of the total gas, and 410 non-statutory undertakings of very small size. Ownership is vested in private companies, municipalities, and gas corporations (sometimes known as "holding companies"). Some 10 per cent. of the gas was bought from coke ovens before the war. The ideas of the industrial North were often found to differ markedly from those of the South, due generally to different conditions. The problem of building up a suitable organisation to weld the industry into a composite whole was one of the greatest magnitude. One glib solution, that would no doubt appeal to politicians of a certain colour, would be that, since the gas industry is a public utility, it should be nationalised. This solution the industry has rejected, and in the report are set forth cogent reasons why nationalisation is quite indefensible as a solution, not the least of these being that it would be impossible to nationalise one of the fuel industries without nationalising them all. Another solution pressed by many within the industry was that of regionalisation, the idea being that each region should be autonomous and operate as a whole, with (presumably) some inter-regional Board to correlate whatever was done. This solution, too, has been rejected on the ground that "District Gas Boards indirectly under the control of the State through its nominees on the Boards, while avoiding outright national ownership and/or direct management, would involve the substitution of an experiment for a well-

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tried system of company and municipal enterprise. . . . . There is no evidence to show that such an upheaval is called for." It must be confessed that the Report gives no reason why the idea of regional District Gas Boards, permitting as it would greater utilisation of gas grids and thorough consideration of each district in the light of its special needs, should be thus abandoned. The solution adopted, however, goes a long way in that direction: it is superficially voluntary, while reserving in the background a big stick, kept in pickle for use on the recalcitrant by the Ministry of Fuel and Power—and it is based on regional development.

We gathered from the Report that the essential difficulty in the gas industry is that many concerns are not up to the standard of technical efficiency of the larger ones, and that because of their size the smaller ones cannot give the same service, nor have they access to the same high standard of technical advice. "The gas industry," says the report, "still consists of too many separate units." The difference between the gas industry and most other industries is that, being a public utility, it is essential that all parts of the country should be given a supply of gas (and coke). Thus it is not possible to arrange for the closing down of redundant undertakings without making arrangements to supply the areas affected. Before the war there had been a voluntary reduction in the number of undertakings and a "substantial measure of organised co-operation and co-ordination" progressively established. During the war it became known that many concerns were below the requisite technical standard and Regional Gas Advisory Boards had been set up by the Institution of Gas Engineers to give the necessary advice and assistance. This, a purely voluntary effort, was crowned with success and appears to have pointed the way to the more permanent post-war organisation.

For the problem of placing the industry "on such a basis that it can best meet the altered conditions of the future and make the largest possible contribution to national and social welfare," the following solution is proposed: A body known as the British Gas Association is to be set up, consisting of a merger of the National Gas Council and the British Commercial Gas Association, the Central Council of which will be the "Parliament" of the industry. The members of this body are elected from District Gas Councils, on which in turn every undertaking in the country will be represented. Thus there is provided a means for the expression of opinion of every individual unit of the industry and, in the outcome, of government of the industry by the industry. Moreover, the technical men of the industry—as represented by the Institution of Gas Engineers—and the plant and appliance manufacturers—as represented by the Society of British Gas Industries—are to have direct delegates on the Association's Council. The gas industry can readily so arrange matters that its members on the gas manufacture side are not mutually competitive in any respect. The contracting side, however, must be competitive. Means have been found, however, whereby the whole complex structure can be integrated. The geographical integration by amalgamation, merger, holding companies, and so forth will be encouraged to proceed as in the past, though possibly at a faster rate, and Parliament is asked to appoint a standing Integration Tribunal to which could be referred any integrating proposal which cannot be agreed upon, or to which the Ministry of Fuel withholds consent. It seems probable that the Regional Gas Engineering Advisory Boards will be continued. In any event machinery is being set up whereby all gas works must comply with certain standards of practice.

These are matters of organisation. On the technical side the gas industry is preparing for long-term changes in engineering technique which must arise as a result of research. High-pressure processing of coal, complete gasification, closer co-operation with electrical generation, and district steam heating are all mentioned in the Report. It is believed, moreover, that vast increases are likely in the demand for domestic gas, and that the field for gas and coke for industrial purposes could more than double the present total output of the gas industry. It is recommended that Regional Fuel Advisory Councils should be created by the Ministry of Fuel to enable the District Gas Councils to co-

operate with other fuel industries and that a national body of the same nature should be set up to facilitate the elimination of wasteful competition between the fuel industries.

Research is already a prominent feature of the gas industry, and the report envisages a considerable increase in that direction. It is computed that the industry spends about £500,000 a year already in that way; the value of the products sold before the war was about £75 million a year, and thus the expenditure claimed is 0.67 per cent. of the turnover —a very respectable percentage, comparing reasonably well with that of the American chemical industry. But we should like some further information before agreeing with this figure. It is stated to be spent on "research and development": we should not be surprised to find that not more than one-fifth, at the outside, of the £500,000 is spent on research as generally understood. There is room for much more to be done and the report calls for a threefold development scheme, covering long-term research, technical development of plant and appliances, and the extension of applied research through the Area Technical Development Centres. Such Centres, which would incorporate the present Industrial Gas Centres, would be based upon selected larger undertakings and would be co-operatively supported by and give advice and help to the undertakings."

This document, which has been briefly summarised here, represents in our opinion a notable contribution to the literature of industrial post-war reconstruction. While not minimising the importance of the industry it concerns, it does not neglect the obvious claims of other kindred industries, and it emphasises throughout the need for coal conservation and for making the best possible use of our coal reserves. The declared aim of the industry is service to the consumer, and the extension of this service is the keynote of the report. We approve the objectives of preparing for technical changes consequent upon research, and of extending research expenditure. Each industry must work out its own salvation in the light of its own circumstances, and although the same procedure may not suit others, the Report of the gas industry is worth careful study as an example of the spirit which should animate industrial post-war planning.

NOTES AND COMMENTS

The Censors' War

AT the London conference last week, at which Dr. Harry Barron spoke about rubber-like plastics, he raised an incidental matter which is of some moment. He referred to the false impression which is created because technical details of new processes widely used in this country often do not appear in British print until after they have been published in the States. We ourselves are acutely conscious of the disparity that exists between the views of British and American censors as to what should and should not be published. We do not, indeed, suggest that our censors never allow stories to be published before the same stories have been published in the States with the approval of the American censors; hundreds of reports are submitted to the censor and are returned to the journals that sent them with few or no deletions, the speed which the censors carry out this routine service deserving high praise. But we do think there should be more co-ordination between the technical censors of Britain and America. We get the impression that the American censors look on themselves as part of the machinery of news dissemination; they are less "security minded" than the British censors, and sometimes they are perhaps insufficiently cautious and secretive. For example, a great deal more has been published in the States about radar—radiolocation as it used to be called—than here, and this has led the well-informed American paper *Electronics* to comment: "It is our considered opinion that there is altogether too much being said and printed about radar at the present time." The really important thing, in our view, is that Britain and America should agree what things the enemy must not hear about, and apply a joint policy consistently.

The Fifth Estate

ALL scientists should read the provocative inaugural address by the new president of the Society of Chemical Industry, Mr. Wallace P. Cohoe, which is printed in *Chemistry and Industry*. Mr. Cohoe considers that men of science have such great responsibilities in modern civilisation that they deserve to be looked upon as the "Fifth Estate." The term is fittingly applied, and readers may recall that it has already been used, with the same meaning, by Sir Robert Watson-Watt in this country. It is indeed encouraging to see that scientists on both sides of the Atlantic are thinking alike on this matter, the relation of scientists to the community. Mr. Cohoe also spoke of the part that the Fifth Estate must play in the post-war reconstruction of Europe. He indicated how it would be possible to prevent Middle Europe from coming under the domination of Germany after the war. He pointed out that Middle Europe was, and is, strong in technological development. To ensure its becoming a technologically self-sufficient province, the members of the coming Peace Conference, suggested Mr. Cohoe, should co-opt chosen members of the Fifth Estate to assist its development. Mr. Cohoe then asked rhetorically a question that the sceptics are always posing — "What do these chemists and engineers know of these important matters? How are they qualified to speak to the heads of great states?" His answer was simple and emphatic: "They can, they do, they have done."

Over the River

HE backed up this answer by quoting the example of the Baruch Commission. This body was set up to solve the problem of America's rubber shortage after the fall of Malaya, and succeeded in doing so. It contained two scientists whom Mr. Cohoe described as being "super college presidents—'super' because they are both scientists of exceptional standing to which is joined outstanding executive ability." Mr. Cohoe envisaged that the future would come to depend to a great extent upon men of this type—the scientific executives. The doubter could, of course, counter Mr. Cohoe's suggestion by arguing that the rubber problem was a technical problem, and solely a technical problem. But, as Mr. Cohoe explained, the business of a modern nation consists of the sum of its technologies, and the welfare of every nation is determined by the degree of its technological development. His final remarks on this theme are worth quoting verbatim. "We chemists are confronted with a responsibility of world-wide importance. We are often so much interested in the immediate problem before us that we often forget that there is something beyond the garden wall, or over the river, or across the ocean. This narrowness, which comes from over-specialisation, is a weakness in itself because it does not produce men of broad scientific vision. . . . We have allowed ourselves to become too much men of the cloister because we have used our vision microscopically instead of telescopically."

British Synthetic Rubber

PRODUCTION of synthetic rubber in this country is now, it appears, an established fact. THE CHEMICAL AGE is informed by the Ministry of Production that Mr. Lyttelton has already granted a licence to British Celanese, Ltd., for bulk production of synthetic rubber in a north-country factory, and, it is stated, production will be well under way by the beginning of next summer. For a long time the official view has been that there was not sufficient justification for the erection of the necessary plant in this country, although the raw materials were available in quantity; but now, we understand, new plant for extracting oil from coal is being constructed for the purpose. The Government's attitude has been changing since the latter end of 1942, when it became evident that the original estimates of American output of synthetic rubber were not likely to be realised. It will be recalled that as recently as last July mention was made, in the House of Commons, of the newly-formed Celanese Plastics Development Company, and it is doubtless in connection with its plastics interests that British Celanese is undertaking the manufacture of synthetic rubber products. Apart altogether from its war-time importance, this creation of a new British industry should have a fundamental effect on our post-war economics.

Recent Developments in Analytical Chemistry—VIII

(From Our Analytical Correspondent)

A SYSTEM of analysis on a semi-micro scale for determining all the ions which contribute to soil salinity has been worked out.[1] By its use it is possible to work with much smaller quantities of soil, and to save in addition both time and reagents while still maintaining an accuracy which is quite sufficient. According to the ion to be estimated, the actual method of estimation may be colorimetric or volumetric. Calcium is precipitated as the oxalate, washed, and titrated in perchloric acid solution with ammonium hexanitratocerate, using nitro-ferroin indicator. Magnesium, which is precipitated as magnesium ammonium phosphate, is estimated colorimetrically on the basis of the phosphate through molybdenum blue. Sodium, precipitated as the triple zinc uranyl acetate, is dissolved in ammonium thiocyanate solution and the colour determined. Potassium is likewise estimated colorimetrically through the cobaltinitrite precipitate and use of the cobalt colour with ferrocyanide and choline hydrochloride. Carbonate and bicarbonate are estimated volumetrically by the classical acid titration with methyl orange and phenol phthalein as indicators. Chloride is estimated by a Mohr's titration. Sulphate is precipitated as benzidine sulphate, and the sulphuric acid freed from this is titrated. Nitrate is reduced to ammonia, which is then distilled and Nesslerised. Without the preliminary reduction, ammonium ion is estimated in the same way.

Microgram Analysis

Benedetti-Pichler and his co-workers have done much to develop the qualitative analysis of inorganic samples so small that the methods applied must be referred to as *sub-micro,* or more precisely, *microgram analysis.*[2] Using methods described in earlier papers, together with improvements, they have now succeeded in devising a system for the qualitative analysis of drops of solution ranging from 0.1 to 0.01 cubic millimetre, and containing mixtures of any of the commoner elements of the hydrogen sulphide group.[3] Such analyses require involved separations, but the authors have been able to detect the elements present, make a semi-quantitative estimation of the amount, and follow this with confirmatory tests. For example, it is possible to make such an analysis of a particle of Wood's alloy weighing one microgram, and to obtain quite a good estimate of all the elements present except bismuth.

Two spot-plates have been described recently. The first one is a development of ideas which have appeared elsewhere, and is half white and half black, with the dividing line running through the usual spot-plate depressions.[4] This enables both pale and strongly coloured precipitates to be seen, and is thus related to the Jena glass spot-plate suggested by Schafer,[5] and intended to be used over both black and white backgrounds. At the same time, it is reminiscent of the recommendation by Arend of black enamelled basins to make precipitates more visible.[6] The other spot-plate is devised for determining the point at which complete extraction of fatty oils in such operations as determination of unsaponifiable matter has been achieved. It consists of ground glass,[7] and when a drop of extracting liquid containing a small amount of an oil is allowed to evaporate on it, a transparent spot remains. As little as one part of oil in 20,000 parts of solvent can be detected in this way, and it is possible to increase the sensitivity even further, either by allowing several drops to evaporate in succession on the same spot, or by applying the principle used to detect finger-prints, *i.e.,* dusting with a fine carbon black, and shaking off the excess.

Spectroscopy

Where spectrographic analysis involves the use of standard mixtures it is obvious that the components of such standards must be of the highest purity. The preparation of such substances as silica, calcium chloride, magnesium sulphate, potassium chloride, and sodium chloride in this state of purity has been

described,[8] together with details of impurities found at various stages of the purification processes. Since it is only the impurities which interfere spectrographically that matter in such work, the investigation of these impurities was mainly by spectroscopic means.

Harrison and Ralph[9] describe the construction of a cheap and easily-made briquetting press which enables powdered samples to be formed into pellets suitable for spectroscopy, and to be loaded on to the electrode crater without handling. By using this method little of the sample is likely to be lost, and there is little danger of it being contaminated.

A simple set-up has been described[10] which is designed for utilising the spark spectrum in qualitative analysis.

Gore describes, at some length, the use of infra-red spectroscopy in the service of the analyst.[11] The apparatus which is required to apply this method is briefly described, and also the preparation of material for observation. The author then goes on to describe various applications both in the qualitative field (where -OH, -CH, -NH, etc., bonds may be detected), and in the quantitative field, in which he also includes certain physico-chemical observations.

The Polarograph

The polarograph has been applied to the estimation of traces of copper, cadmium, nickel, zinc, iron, and lead in aluminium of high purity.[12] A 5 gm. sample of the metal is opened up with potassium hydroxide, and the impurities are separated as sulphides. Then follows the fractional solution of the nitrates in ammoniacal and acid media, and three determinations with the polarograph enable copper, cadmium, nickel, and zinc to be determined together, and iron and lead separately. On a sample of this size, as little as 0.00003 per cent. of each impurity may be determined, with a precision of $\pm$ 5 – $\pm$ 1 per cent.

A rapid polarographic method for the estimation of lead in lead-bearing steels[13] is claimed to fill the gap already closed for other elements, which may usually be estimated rapidly using either colorimetric or potentiometric methods. For steels which contain 0.1-0.4 per cent. of lead, a precision of $\pm$ 0.01 per cent. is claimed. It is not necessary to add a supporting electrolyte, as the ferrous chloride in the solution is found to be suitable. A small amount of gelatine acts as a maximum suppressor.

The direct estimation of manganese by the polarograph is not possible owing to the interference of a number of other metals. A method has been devised[14] in which the manganese ion is oxidised by lead dioxide in a solution containing pyrophosphate. After three minutes' shaking, with the *p*H at 4.0 and a large excess of pyrophosphate, the oxidation of the manganese to a violet coloured complex—the tri-dihydrogen-pyrophosphate manganate—is complete and quantitative. The *p*H is then adjusted, with thymol blue as indicator, to 2.0-2.4, and peptone or gum arabic added as maximum suppressor. The difference between the current before and after the oxidation is used to indicate the manganese content.

Small amounts of pyrophosphate may be determined in the presence of more than sixteen times the amount of orthophosphate by a polarographic method.[15] The pyrophosphate is precipitated as cadmium pyrophosphate, and this precipitate is dissolved in dilute hydrochloric acid, potassium chloride added as supporting electrolyte, and the cadmium determined by the polarograph. For convenience, although it is a less satisfactory method, the precipitate may be dried at 250° C. and weighed directly as anhydrous cadmium pyrophosphate.

Magnesium may be estimated polarographically as the compound with 8-hydroxyquinoline, since investigation has shown that when this is reduced at the dropping mercury electrode the diffusion current varies directly as the concentration of magnesium.[16]

Formaldehyde in biological material may be distilled and then estimated polarographically.[17] As little as 3 micrograms of formaldehyde per ml. of distillate may be determined, and the method is particularly useful in that it is applicable in the presence of acetaldehyde.

Chromatographic Analysis

The methods of chromatographic analysis have been applied to a wide range of organic compounds with success. Using commercial charcoal as the adsorbent, fairly satisfactory separation of the amino acids glycine, leucine,

phenyl alanine, and tyrosine has been achieved.[18] There was a little decomposition of the acids, but it was found possible to remove such decomposition products as were formed by subsequent recrystallisation. The separation was much sharper than could be obtained with convenience by other methods.

The components of linseed oil were adsorbed on alumina,[19] and *n*-hexane was used as solvent. By this means a thin coloured layer at the top, which also contained impurities, could first be removed, and the remainder of the column was cut up into lengths which were eluted separately; afterwards determinations such as iodine values and refractive indices were made. In this way four distinct fractions were obtained. This method of separation when applied to drying oils is obviously of considerable advantage, since it is carried out at room temperature and also, if desired, in an inert atmosphere, so that alteration of chemical nature may be avoided.

Higher fatty acids have been separated on heavy magnesium oxide impregnated with phenol red.[20] This dye is not affected either by the solvent carrying the fatty acids (petroleum ether), or by the solvent subsequently used to take up the adsorbed acids (diethyl ether). The function of the phenol red is to act as an indicator of the zone or zones containing the fatty acids; it does this by a change to a yellow pink or light pink, and only the zones thus indicated need be further treated. This is done by dissolving in hydrochloric acid, extracting the fatty acid, and washing out the acid and the phenol red with water, followed by drying and evaporation to dryness in a stream of nitrogen. By this method, it has been found possible to separate an unsaturated and a saturated fatty acid with the same number of carbon atoms, and to separate two saturated fatty acids, one of which had four more carbon atoms in the chain than the other.

The isomeric *cis*- and *trans*-stilbenes can be separated, and as little as 2 per cent. of one detected in the other, by a chromatographic treatment.[21] The zones formed by each of these are colourless and have to be detected by brushing a thin line down the side of the extruded column with dilute permanganate solution, which turns brown almost immediately on touching one of the zones. The same principle has been applied to the separation of the *cis*- and *trans*-isomers of benzoin oxime and anisoin oxime, this time using as detector ammoniacal copper sulphate solution;[22] this solution is turned brown by the *cis*-isomer, and deep green by the *trans*-isomer.

The separation of sugars has been achieved by preparing the *p*-phenylazobenzyl esters, which are then absorbed on silicic acid and other adsorbents. It was found possible to obtain separations in this way of two monosaccharides, a monosaccharide from a disaccharide, two disaccharides, and a monosaccharide from a trisaccharide.[23]

The theory of chromatography has received attention in two papers. The behaviour of boundaries is discussed by de Vault,[24] who shows, among other points, on a theoretical basis, that where two solutes are present, the concentration of the faster-moving solute in the head of the band tends to be greater than in the original solution. During development, the concentration of the slower-moving solute will, however, tend to be smaller at the (pure) rear of the band than in the overlapping band between the two solutes. Some terms which should assist in the standardisation of chromatography are defined and treated quantitatively by Le Rosen,[25] who points out that these terms help to characterise and standardise adsorbents. From them the relative positions of chromatographic zones can be predicted, and cases of inversion of the order of zones on different adsorbents have been foretold by calculation in certain observed examples.

Organic Groups

The estimation of the acetyl group in carbohydrate acetates has been described by Whistler and Jeanes.[26] By treatment with sodium methoxide (as catalyst) in methyl alcohol, a trans-esterification reaction takes place, yielding methyl acetate. This is distilled over, and saponified in standard alcoholic alkali. Since the acetyl group is thus separated completely from the non-volatile acid groups, the technique provides a convenient and rapid method of obtaining reproducible results without interference. A similar principle has been applied to acetyl and other volatile acyl groups in

cellulose esters,[27] *p*-toluene sulphonic acid also being used as catalyst. Since the methyl esters which result are more volatile in methyl alcohol than the remainder of the cellulose esters are in steam, the ester is once more separated by distillation, trapped in standard alkali (aqueous alkali is recommended) and saponified, after which the acetyl or other group is estimated by titration in the normal fashion.

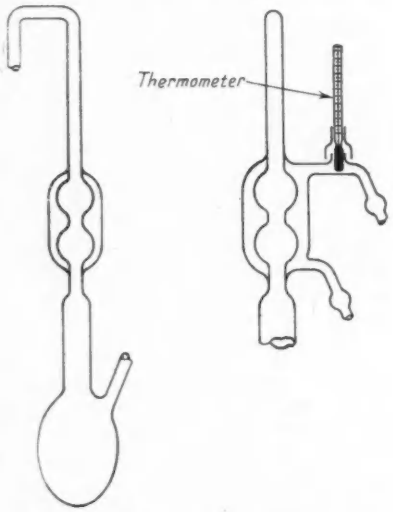

Fig. 1. Small water condenser for use in micro-estimation.

The detection of the methoxyl (and other alkoxyl) groups can be carried out by a simple method based on Zeisel's reaction.[28] The material to be tested, preferably 0.1 ml. of a liquid or 0.1 gm. of a solid, is placed in a test-tube, followed by a ml. of glacial acetic acid and a ml. of hydriodic acid. A small granule of porous pot is also added. A plug is formed from a roll of cheese-cloth which has been impregnated with a solution of lead acetate, sodium hydroxide, sodium thiosulphate and glycerol, the last to prevent drying, and the other constituents to remove interference. A small layer of non-absorbent cotton follows the filter, and then a strip of filter paper moistened with a saturated solution of mercuric nitrate in 2 per cent. nitric acid, which is the test paper for the confirmation of the presence of the methoxyl group. The test-tube is immersed in a glycerol bath maintained at 120-130° C. If methoxyl is present in the test substance a yellow colour will spread up from the bottom of the test paper and will then change to bright orange or to vermilion. (In some instances it has been found that the vermilion colour appears suddenly all over the test paper.) If the yellow colour does not change to vermilion within ten minutes, the test is negative or doubtful. Although the quantities mentioned should be used if possible, it has been found that a positive result can be obtained with as little as 5-10 mgms. of some compounds.

Meinhard[29] recommends that a small water-condenser should be added at the top of the flask in the Pregl micro-estimation of the methoxyl group in order to maintain the correct temperature, and so simplify the carrying-out of this determination. Two views of the construction and placing of this condenser are shown in Fig. 1.

The estimation, on the micro-scale, of the hydroxyl group has been investigated by Petersen, Hedberg, and Christensen,[30] who have developed a simple method based on esterification of the compound with acetic anhydride-pyridine in a hermetically sealed tube. The method has proved reasonably satisfactory when dealing with primary or secondary alcohols. The material and esterifying reagent are sealed in a tube, 6 cms. long with a diameter of 3 mms. After shaking, the whole is allowed to stand for 24 hours, together with a blank. The test and the blank are then broken into 50 ml. Erlenmeyer flasks, 5 mls. water are added to each, and they are titrated with 0.04 N sodium hydroxide.

Benzene

When *m*-dinitrobenzene is treated with acetone or methyl ethyl ketone and strong alkali, a crimson coloration is produced. This has been adapted by two different workers so as to enable benzene to be estimated, as well as the other homologues which give rise to similar colours. Dolin[31] concerns himself primarily with the estimation of benzene itself, either alone or in the presence of toluene and other homologues. The material is first nitrated at 0° C., with a mixture of equal parts of nitric and sulphuric acids, and

the resultant nitro body is extracted with ether. In these conditions, benzene is practically completely converted into *m*-dinitrobenzene. Since the nitration products of toluene and xylene are also extracted, and give colours with methyl ethyl ketone and alkali, Dolin overcomes their interference by treating the solution, after formation of the colour, with acetic acid. The colours due to the higher homologues disappear quickly, while that due to benzene is relatively stable and may be measured colorimetrically by any standard procedure. Since aliphatic hydrocarbons are unaffected by the treatment, benzene may thus be estimated in a range of mixtures. Baerstein[32] extends the method to toluene and the nitro-derivatives of benzene and toluene, describing the colours to be expected, and the best conditions for exact quantitative results. In order to estimate benzene in the presence of toluene, a different principle from that described above is applied by him. When a mixture of dinitrobenzene and dinitrotoluene is treated with chromic acid, the latter is oxidised, and no longer gives a colour with the ketone and alkali, while the dinitrobenzene remains unaffected, and may therefore be measured as before.

Identification of Natural Products

A series of articles, fully illustrated by photomicrographs, covers the identification of starches from potato, wheat, and bean[33] from rye, barley, oats, rice, maize, and millet,[34] and from a variety of roots, tubers, and other sources.[35] The photomicrographs, which have been obtained both by ordinary and by polarised light, should be very useful to anyone who requires to distinguish between various starches.

The properties which can be used for the identification of plywood glues have been described fully by Rendle and Franklin.[36] These include the nature of the wood itself, the general appearance of the adhesive, its physical and chemical properties, such as *p*H and fluorescence, resistance to organisms and to water, staining reactions and microchemical tests for the adhesive itself, the filler in it, and other materials which it contains such as starches and proteins. Both natural (animal, etc.) and synthetic adhesives are covered by the article.

Organic resins and lacquers have been dealt with from the standpoint of chemical analysis.[37] The materials are divided into two broad classes on the basis of the elements found and of saponification behaviour. This is then followed by examination of such factors as fluorescence in ultra-violet light, examination of the products of dry distillation, and further tests.

In an article dealing with the identification of charcoals from British hardwoods, the fact that the original structure of the wood is not destroyed in the process of conversion to charcoal is widely utilised.[38] Thus it is possible to identify with a fair degree of certainty the original source of lump charcoal if a good knowledge of the appearance of various woods under a hand lens and to the naked eye is possessed. To this end a very fine series of photographs of transverse sections of British hardwoods at a magnification of x10 is provided, and a tabular method of identification of the charcoals through the fine structure is worked out.

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LETTER TO THE EDITOR

A.B.C.M.

SIR,—I attended the annual general meeting reported in your issue of October 30, and beg to point out that it does not give an accurate picture of what took place, and, as members are unlikely to receive any report direct from the association for three or four weeks, I should like the opportunity of making some additions and comments.

With a membership of 167, only about 30 were present, mainly officers and officials, and duplicate representatives of member firms. In effect, therefore, the officers proposed, seconded, and approved the work for which they themselves are responsible, and re-elected themselves as well as the group committees, even though some of the latter were not nominated.

Prior to the opening of the meeting, the assistant manager did ask me to second the adoption of the report and accounts, but he, being aware of my views, was probably not surprised when I declined the honour. I understood the honorary treasurer to say that, the income having reached peak, the credit balance may be less in future. This seemed to envisage higher subscriptions, seeing that proposals for increased expenditure are under consideration. Therefore, any questions were relevant and necessary.

I asked two questions: as to the salaries paid to the general manager, secretary and assistants, and to the office staff (together, more than 50 per cent. of the total income of the association); and how they compared with pre-war. These questions were disallowed by the chairman as being irrelevant at an annual general meeting. I accepted this ruling under protest, and owing to hostile interruptions I realised the futility of putting further questions on the accounts.

My questions on the report established that: (1) A subsidiary of an existing member taking up individual membership became entitled to one vote, and the more subsidiaries doing this the greater the total number of votes there were between them; (2) The practice of inviting members to make verbal objections to new applications for membership of the association was confirmed and approved as being in order; (3) The negotiations—not mentioned in the report—for the proposed co-operation and/or amalgamation of the Federation of British Industries and the British Employers' Confederation are proceeding.

These I considered unsatisfactory, and wished to discuss them, but owing to the continued hostile atmosphere I requested the chairman to grant me a further opportunity for questions and discussion, which was completely ignored.

In my opinion, the whole proceedings were farcical and I asked myself why my relevant questions and comments should cause such consternation. It seems that the question of obtaining compulsory powers, already turned down by the members, is not to be dropped, but carried through under the guise of "Central Planning" and "Publicity" by a "General Staff."

Since the annual general meeting a circular letter to members warns them not to communicate any association matter to the Press or anyone outside the Association, which obviously means that all publicity is to be from the official side only. Is this the "freedom" for which our schoolboy sons are fighting and dying? Frankly, I do not know whether I am a member of a trade association, a Government department, the Federation of British Industries, or a budding Gestapo; but perhaps an overhaul of the A.B.C.M. itself would clarify this for me and any others who may think as I do.

My 37 years' experience in the chemical industry, and a not unimportant contribution to the national effort, coupled with a very serious study for the past twelve months of the activities of the A.B.C.M., quite clearly indicate to me the trend of events, and the danger of complete subjugation of the small firms to the big concerns and vested interests.

I trust you will be good enough to give publicity to this letter, as the subject is one on which I feel most strongly if those engaged in the chemical industry, both large and small, are to continue the good work for which all have been responsible up to now.

—Yours faithfully,

for Athole G. Allen (Stockton), Ltd.,
ATHOLE G. ALLEN.
(Chairman and Governing Director.)

November 2, 1943.

MODERN PEAT TREATMENT

The generation of a producer-gas from peat with by-product recovery was mentioned by Dr. H. R. Soper in a paper before the Graduates' and Students' Section of the Institution of Chemical Engineers. In view of the increasing importance of synthesis gas (water gas) a brief account was given of recent successful German experiments on the manufacture of such a gas from peat by the Pintsch-Hillebrand process. Low-temperature carbonisation of peat in hardwood distillation ovens, and high-temperature carbonisation in Glover-West vertical retorts were described, and the yields compared. Recent experiments on continuous carbonisation of milled peat and alkaline carbonisation for optimum production of tar and chemicals were also noted, as well as the almost complete solubility of peat in tetralin under pressure. Dr. Soper finally drew attention to the rapid rate of consumption of high-grade materials and stressed the importance of peat as a raw material of the future.

A Review of Progress

Dr. Armstrong on Research

Dr. E. F. Armstrong

IN his presidential address to the Royal Society of Arts, at the opening meeting of the current session held on November 3, in the Society's rooms in the Adelphi, Dr. E. F. Armstrong, F.R.S., had much that was stimulating and suggestive to say under the rubric "The Long Road to Progress," reviewing, as the title implies, both past, present and future. A few brief extracts from his remarks will not fail to be of interest to industrial chemists who have regard for the trends of informed public opinion.

To begin with, Dr. Armstrong gave a brief outline of the history and purpose of the Royal Society of Arts, and his remarks on tradition are well worth a second thought, in these days especially. "The Society," he said, "has a great tradition which we must uphold; we can claim to have been essentially progressive while continuing to respect precedent. I have no sympathy with those reformers of to-day, obsessed, I suspect, with an inferiority complex, who would sweep away all the past. Tradition, after all, is a source of the undying vigour of our race; yet there is a tendency, at the moment, to despise tradition and under-rate experience. We are playing on a new stage with new scenery, but examination will reveal that the actors are not so different from those who have played on other stages and with other scenery and is surely worth while to connect our experience and theirs, hoping to achieve consistent progress and to avoid the fever and confusion of the emergency way of thinking. The type of mind all too prevalent in this generation, which creates an emergency out of every situation, can hardly have the quality which survives the changing circumstances of one decade after another and does not get too excited with difficulties or too elated with success."

Recent History

Dr. Armstrong went on to speak of the necessity for making their library serve definite ends rather than be merely a repository for books. He referred also to the neglect of the times immediately preceding our own, and to his hope that arrangements would be made to compile short biographies of past members of Council—a work which will be of high importance in the history of scientific industry. Speaking of industrial science within the past century, he said: "A hundred years ago, most manufactures were arts, those trained in them had discovered how to perform the necessary operations. To-day, science has supplied reasons for the practices and taught how to improve them further, but they are none the less arts defined in the dictionary as skill as the result of knowledge and practice and anything wherein skill may be attained. This is still the implication of the word in the title of the Society.

Perhaps most interesting of all was the reference that Dr. Armstrong made to the position of research at the present day, and of the public attitude to scientific matters. In view of the enormous leeway that mankind will have to make up in order even to regain the level attained before the war, Dr. Armstrong's words of wisdom cannot be too strongly stressed, and we report this section of his address in full. Research, he said, "should always be a burning question to a progressive nation and never more so than at the present moment. There are several kinds of research including academic, industrial and commercial, and the word is sometimes spoken almost in awe. In fact research is nothing more mysterious than an organised hunt for facts, a system of planned experiments designed to yield useful facts before these facts are revealed by chance. It is a hunt for facts to solve specific problems; it is the opposite to rule of thumb.

"Industry must build, must progress even to survive. It must have ideas and know how to convert these into pounds or dollars. Research is moving on all around us; the management must see to it that it moves through and not around a factory. In a decade a hundred novelties have been converted into necessities, sometimes as the result of the application of fundamental work, often termed long-distance research, done in the laboratories of the universities, at other times as the result of *ad hoc* research made within an industry to solve a particular problem. Research has evolved new and improved old products; it has found new uses and broader markets; it has eliminated waste and cut costs. A business depends so much on really new ideas which are the harder to come by as the worker spends longer and longer in it. Hence the idea that

the most profitable research is that which is carried on with the least restraint imposed by current practice.

"It must be confessed that America has embraced the idea of scientific research very much more than we have during the last 20 years, and they are, in fact, spending very large sums on it. It was estimated that in 1941 they spent over 300 million dollars on research. Over 2000 firms have their own well-equipped scientific research departments and the development of all the new products coming from America is largely due to this scientific research.

"Sir Kenneth Lee has told us that what most impresses in the U.S.A. is that they are going to be a world exporting country, simply because they are going to invent new products with greater and greater rapidity. Unless, therefore, we ourselves are going to take a very different stand after this war, *vis-à-vis* education and science, we shall be left hopelessly behind. An ever-increasing number of industries have had their birth outside this country and, while we have outstanding successes to our credit, we have not, in view of our past history, taken anything like the initiative we should in the development of modern industry. The world is changing its habits very rapidly, the best processes grow out of date, the best factories grow old. It is not always realised, particularly in these days of talk of management by the workpeople, that factories are worth as much as the ability that directs them and not a penny more. A good managing director is more important than the whole staff, but he cannot work without their confidence and co-operation.

The Art of Management

"What is not always understood about research is the kind of men required to carry it out efficiently and the nature of the facilities they need. The head should be a scientist who can get along with men, properly trained, but not over-trained; he must have the spirit of adventure and be encouraged in every way to use his imagination and keep alight his enthusiasm. An American friend of high standing gives this suggestion for managers, 'To manage men successfully, learn to think as they think. Know their hopes and fears and aspirations. Know how they look at life. Find out what pleases and what angers them. Discover what goads their ambition. Enter into their mind. Try to think, not as a manager thinks, but as the managed think. Then you will become a true leader.' A research department must be changing all the time so as to bring in young men with ideas; people who grow comfortable in it and mentally lazy should be moved elsewhere in the organisation.

"The greater number of our ruling classes are by no means science-minded. They do not understand it and their attitude varies all the way from passive superciliousness to outspoken hostility. Those of us who understand the importance of science in the general complex of human affairs do not always realise how recently science has overcome various forms of popular prejudice. Following the Restoration, science in Britain became largely the occupation of the aristocratic and wealthy; it was for the most part followed along lines that had little or no economic application. This aspect was attacked by Charles Dickens on the occasion of the first meeting of the British Association.

"As Sir Lawrence Bragg has told us in a recent address, science in England has gradually come more and more into popular favour. Applied science has made rapid strides and is now quite as fully developed and as highly regarded as it is in any other land. The rise in the prestige of applied science, however, has not been accompanied by any noticeable decline in the popularity of pure science, so that here we find the two types advancing side by side in more or less ideal balance. But, unfortunately, science in Britain still does not have the complete confidence of the public, and is not by any means free from neglect, disparagement, or even attack in the popular Press.

"Popular interest in science must not only be maintained, it must also be increased if we are to hold our own in the years to come, for whether carried on under Government support or in endowed institutions of learning, the full development of our scientific potentialities is dependent upon a sympathetic public attitude. In order to secure, to maintain, and to increase public interest in, and sympathy toward scientific work, and to convert the still disconcertingly numerous unbelievers, it is essential that we continually provide the public with news regarding scientific progress in all lines of interest to them, from both the material and non-material or philosophic points of view. Such impersonal news is especially desirable in times of national emergency."

SILVER FUNGICIDES

The use of silver compounds as fungicides is described by Lowell W. Nielsen in Memoir 248 of the Cornell University Agricultural Experimental Station. Trials were made to test the ability of various silver compounds to control potato blight, and it was found that a combination of silver nitrate, ferrous sulphate and lime in the proportions of 15 : 25 : 15 was the most effective. At a dilution to a strength of 100 p.p.m. of silver, the cost of the spray worked out at one cent per gallon of spray fluid. The experiment formed part of a search for a spray fluid which would be less harmful to certain kinds of foliage than those commonly used.

Perchloric Acid*

Electrolytic Preparation from Sodium Chloride

THE manufacture of perchloric acid from sodium chloride involves the following steps: (1) the electrolytic oxidation of sodium chloride to the chlorate[1]; (2) a second electrolytic oxidation of sodium chlorate to the perchlorate; (3) the treatment of pure sodium perchlorate by metathesis with concentrated hydrochloric acid which almost quantitatively precipitates sodium chloride[2]; and (4) the subsequent isolation of perchloric acid by concentration of the filtrate to evolve the hydrochloric acid.[2] An alternative scheme involves the formation of ammonium perchlorate from the sodium perchlorate followed by the oxidation of its ammonia content by mixed nitric and hydrochloric acids.[3]. A second alternative is the electrolytic oxidation of hydrochloric acid by the Goodwin and Walker[1] process, which, however, has never been used as the basis for the industrial operation in quantity production.

Description of the Cell

The elimination of overseas sources of sodium or ammonium perchlorate due to the present world war has resulted in the construction of numerous manufacturing units for large-scale production of perchloric acid from sodium perchlorate. The construction and operation of the cell employed in the electrolytic oxidation of sodium chlorate to perchlorate for quantity production has not been previously described. The present equipment so far as is known involves the exclusive use of platinum anodes and iron cathodes. The electrolytic cell does not employ a partition to separate anolyte from catholyte. As a result, near the end of the reaction the current efficiency falls off and the wasted energy results in the production at the anode of ozone and oxygen. This gaseous mixture from the anode is free to mix with the hydrogen from the cathode reaction and the consequence is the formation of an explosive gas mixture. Hence, in the operation of the cell, at the completion of each oxidation, which must be carried out to the complete removal of all chlorate up to 99.5 per cent. minimum oxidation, care must be taken to prevent ignition of the gas mixture of the cell or disastrous explosions may be encountered. The use of sodium perchlorate of greater than 0.5 per cent. sodium chlorate content similarly would cause explosion when the hydrochloric acid metathesis to form perchloric acid is carried out.

The remedy to this situation involves the completion of the sodium chlorate oxidation to 95 per cent., followed by the removal of the chlorate impurity by electrolytic reduction, which cannot result in any reduction of perchlorate, but does eliminate explosion hazards both in the cell oxidation and sodium perchlorate metathesis following for the production of perchloric acid.

A study was, therefore, made of the proper cell design for use in the oxidation of sodium chlorate to perchlorate, the performance of such a cell under working conditions, and the development of an analytical procedure for the determination of chlorate in the presence of perchlorate. The proper selection of electrodes and cell design for the electrolytic reduction of chlorate to chloride in the presence of sodium perchlorate was also studied.

Determination of Chlorates

A convenient method of chlorate analysis which can be applied to check the sodium chlorate content in an electrolytic cell liquor used to prepare sodium perchlorate from sodium chlorate has to be applicable in the presence of perchlorates. The oxidation potential of chloric acid with respect to its reduction to chloride is + 1.45 volts as given by Latimer,[5] and from thermodynamic considerations chloric acid should be a strong oxidising agent. In reality the kinetics of its reactions are such that its reduction is extremely sluggish. This situation is very apparent from the fact that its electrolytic preparation starting with hydrochloric acid is successful without the use of a diaphragm cell.[4] From general considerations the reducing agents with the best possibilities for use are ferrous sulphate and sodium arsenite. Gleu[6] employed sodium arsenite in excess to reduce chlorates to chlorides in the presence of osmic acid. Since the data given by Gleu are of limited scope, it was deemed advisable to study this convenient reaction thoroughly. Ferrous sulphate was similarly used to reduce chlorates in the presence of sulphuric acid with osmic acid as catalyst.

Sodium and potassium chlorate salts recrystallised from water and dried at 90° C. were established as standard of reference purity salts by the following procedure: 150-mgm. samples are dissolved in water, and 0.15 ml. of 0.01 M OsO_4 in 0.1 N H_2SO_4 is employed as catalyst. An excess of approximately 0.25 N sodium arsenite is added along with sufficient 9 M H_2SO_4 to make the reaction mixture 1 N in acid concentration. A reaction time of at least 15 min. is allowed, after which the excess reductant is back-titrated with standard 0.1 N sulphato ceric acid in 1 M H_2SO_4, using ferroin as indicator. In this procedure it was not

* Abstracted from a thesis by A. J. Veraguth, University of Illinois.

necessary to add sodium bicarbonate to the reaction mixture to exclude air as was pointed out by Gleu.[6] The presence of perchloric acid instead of sulphuric acid in the above procedure offers no interference in the chlorate determinations.

The procedure for ferrous sulphate as reductant is similar to that given for the sodium arsenite except that the reaction time necessary is longer, namely, 30 min. are required at the 1 N sulphuric acid concentration; when the acid concentration is 3 N the reaction time is shortened by half.

Electrolytic Reduction of Chlorate

The problem at hand was to select a metal cathode which would reduce the residual 5 per cent. of sodium chlorate in the commercial electrolytic cell which produces sodium perchlorate from the chlorate. Foerster[7] and Müller[8] asserted that a strong reduction was observed by iron and a weak reduction by cobalt, but that the reduction by a whole series of other metals was completely absent. McLaren and co-workers[1] emphasised that rusty iron cathodes effected reduction at the cathode to the extent of 100 per cent., but a clean iron surface gave only a small amount of reduction. In acid solutions with cathodes of zinc, cadmium, and platinum Voege[9] found that electrolytic reduction occurred, but to work with acid solutions in the practical problem as stated is undesirable. In this study only neutral media were considered. The metals employed as cathodes were platinum, nickel, tin, tungsten, molybdenum, chromium, bismuth, carbon, zinc, and iron, all of which gave negative results except iron.

The apparatus used to study the mentioned metal cathodes was described. The use of a diaphragm cell was found to be unessential. Subsequent operations were in a cell without a diaphragm, and the platinum anode area was reduced from 400 to approximately 10 sq. cm.; the iron cathode area was 100 sq. cm. With these conditions the reduction of the 5 per cent. sodium chlorate solutions varied from 45 to 58 per cent. at current densities from 0.01-0.04 amps. per sq. cm. of cathode area. A synthetic cell liquor prepared with 76 gm. $NaClO_4$ and 4 gm. $NaClO_3$ per 100 ml. showed reductions of 99.0, 99.6, 99.4, and 99.9 at the respective current densities of 0.01, 0.02, 0.03 and 0.04 amps. per sq. cm. Thus, a 95 per cent. oxidised perchlorate liquor could be freed of its residual 5 per cent. chlorate content by electrolytic reduction, using a large-area iron cathode and a platinum anode of small area at a current density of 0.02 or 0.03 amps. per sq. cm. at the cathode.

Since the presence of chromates retards the reduction at the iron cathode, it is proposed to use one of the metals studied to reduce chlorates, which gave negative results in the absence of chromates. Then, assuming that identical hazards are involved near the end of the completed oxidation, the cell liquor could be transferred to a cell with an active rusty iron cathode to free the cell liquor from its chlorate content. The perchlorate ion will not reduce, and the presence of chloride does not interfere with the subsequent operation to obtain perchloric acid from the sodium perchlorate.

Operation of a Commercial Cell

Little practical information is in the literature concerning suitable cell design and operation characteristics for quantity production of sodium perchlorate from the chlorate. The cell construction is described consisting of a glass-lined steel tank 2.875 ft. by 2.815 ft. in cross section by 5.5 ft. in length. Eight electrode assemblies are mounted in the tank on each of the two side walls. Each electrode assembly consists of a 2.5 in. diameter iron pipe 27 in. long as cathode, which supports a coaxial platinum-clad copper rod anode by means of porcelain insulators. The steel tank serves as the contact to the busbar cathode which leads to the source of power. Multiple busbar contacts to the anodes complete the circuit. The capacity of the described perchlorate cell is approximately 250 gallons, and a saturated solution of sodium chlorate along with 4 lb. of potassium dichromate which is added to inhibit the sodium chlorate reduction are introduced as the cell liquor. Data are given for the cell operation at a current density varying from 320 to 492 amps. per sq. ft. of anode surface at a voltage range from 5.8-6.5 volts across each electrode assembly. The current efficiency of the operation is around 53 per cent. It is apparent from the data obtained that the oxidation does not proceed smoothly until the electrodes are sufficiently activated. A smooth oxidation continues after 24 hours until 65 per cent. oxidation is reached, at which point a great deal of current is consumed to liberate oxygen and ozone at the anode. The electrolytic reduction of the remaining chlorate, as described above, is recommended to eliminate the obvious hazard when the cell liquor is 95 per cent. oxidised.

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Parliamentary Topics

Wolfram for Germany

IN the House of Commons recently Mr. G. Strauss asked the Parliamentary secretary to the Ministry of Economic Warfare the approximate amount of wolfram and other vital war materials exported during recent years from Portugal to Germany, and whether these exports would cease in view of the recent change in policy of the Portuguese Government. Mr. Dingle Foot replied that Portuguese exports of wolfram to Germany amounted to 185 tons in 1940, 1814 tons in 1941 and approximately 2000 tons in 1942. Thirty tons of tin concentrates were exported in 1940, 45 tons of concentrates and 546 tons of metal in 1941, and approximately 600 tons of metal in 1942. The recent Anglo-Portuguese agreement, he added, did not involve any change in the commercial policy of Portugal.

Mr. Strauss: Is it not a fact that if these supplies of wolfram, tin and other metals were cut off, it would deal a severe blow indeed at Germany's war industries? Ought not drastic steps to be taken to persuade our oldest ally not to continue to assist Germany in this way?

Mr. Foot: I entirely agree that it would be a very heavy blow at the enemy's war effort. As regards the second part of the supplementary question, all I can say is that this is something which is never forgotten at any time by my department.

Further questions about these exports were asked by Mr. G. Strauss, who suggested action by H.M. Government to persuade the Portuguese Government to refrain from supplying the Axis with tin and wolfram. Mr. Law replied that our Government had left the Portuguese Government in no doubt as to the importance attached to these exports. Agreements had been made providing that the greater part of the total Portuguese wolfram output came to the United Nations, and every effort would be made to reach a further agreement to this end.

Adequacy of State Research

Rear-Admiral Beamish asked the Lord President of the Council whether he would invite the War Cabinet Scientific Advisory Committee to consider the general policy to be adopted in planning and financing scientific research in special fields which could be justified in the national interest and for which at present no method of approach or regular provision for support was available through existing official channels.

Mr. Attlee: I am satisfied that, in general, existing arrangements provide full opportunity for the consideration of any new scheme of scientific research which may further the national interest. In particular, the desirability of extending, where suitable, the fields of inquiry of the D.S.I.R. and the Medical and Agricultural Research Councils is kept well in mind. While in these circumstances I see no point in asking the Scientific Advisory Committee to undertake a general review of the kind suggested, I should not hesitate to ask the advice of the committee on such matters if the occasion arose. I am having inquiry made into three particular instances which my hon. and gallant Friend has brought to my notice, but I may say at once that the importance of these topics has not been overlooked in the past.

Rear-Admiral Beamish: Is the right hon. Gentleman aware that his reply will give considerable satisfaction in many useful directions?

Sir H. Williams: Are the Government considering the possibility of establishing in this country anything comparable with the Mellon Foundation in the United States? Mr. Attlee: I should require notice of that.

Light-Castings Industry

Mr. Maclean asked the Secretary of State for Scotland whether, in any scheme for industrial organisation, the claims of the Scottish light-castings industry would be considered, particularly where a change over from cast-iron to alternative production methods were contemplated. Mr. Johnston replied that the Scottish Council on Industry had under consideration the position of this industry, and he himself was in close touch on the matter with the ministries concerned.

Bauxite from British Guiana

Mr. Creech Jones asked the Secretary of State for the Colonies whether plans were being considered in British Guiana for the erection of aluminium refineries with a view to avoiding the shipment of bauxite to Canada.

Colonel Stanley: I am not aware that plans such as those referred to by my hon. friend are being considered. While the erection of a refinery in British Guiana would no doubt save shipping, it would involve a duplication of plant which could hardly be justified in present circumstances. The Aluminium Company of Canada, the parent company of the Demerara Bauxite Company which mines bauxite in British Guiana, has greatly extended its refineries in Canada in order to cope with increased production of bauxite in British Guiana for war purposes. The Aluminium Company's refineries in Canada are situated in the hydro-electric area of the St. Lawrence in Quebec where there is abundant and cheap power available. Some of the rivers in

British Guiana could no doubt be harnessed for hydro-electric purposes, but this would take some time, especially in the undeveloped hinterland of the Colony. The question of hydro-electric schemes in British Guiana will no doubt be further considered after the war.

Metallgesellschaft and I.G.

In reply to an inquiry from Mr. N. Maclean, the President of the Board of Trade said he had no evidence of the existence of any relations between British firms and Metallgesellschaft since the outbreak of war. He referred to his earlier statements to the effect that all German patents had been abrogated and all agreements with enemy aliens legally frustrated.

Mr. Ellis Smith asked a similar question regarding I. G. Farbenindustrie and received a similar answer. He was further informed that the Manchester office of I.G. had gone into liquidation.

Oil from Coal

Mr. Sexton asked the Minister of Labour whether, in view of the urgent need of motor spirit and diesel oil, he would grant improved labour facilities for their production from coal to those who were prepared to do so at their own expense. He also inquired whether the Minister would consider the question of securing the return to the Welbeck oil-from-coal plant of the three key men necessary to re-start the production of oil from coal.

Mr. Bevin replied that he was communicating with the Minister of Fuel and Power on this subject.

British Fluorspar

A Mineral with a Future

by A. G. BENNETT

ON September 27, 1943, at the Rutland Arms Hotel in the village of Bakewell, Derbyshire, the fluorspar producers of that county, responsible for about 75 per cent. of British fluorspar production, met for the first time under one roof, and in so doing made fluorspar history. Future chroniclers of this important, but insufficiently publicised, industry will, we believe, select this date for especial attention, for it was provisionally agreed—subsequently to be ratified at the meeting of October 25—that there should be established "The Derbyshire Fluorspar Producers' Association." An important date indeed, for is it not remarkable that such unanimity of purpose should be declared on the first occasion that producers had foregathered?

The Derbyshire Miner

The Derbyshire man is an individualist, prepared to live his life in accordance with his own ideas and ideals, and in the Derbyshire fluorspar miner, living on the bleak moorland, often solitary, always near to nature in all her moods, there is individuality developed to the highest degree. It is clear, then, that the decision to form themselves into a corporate body can only be the result of a far-seeing purpose and a determination to retain the eminence that they have so deservedly attained, in winning from a provident but provocative soil an ingredient to which our present existence owes so much.

The time is apposite for reviewing the circumstances that have led to the inception of the Association. Fluorspar, as well as being a mineral with a future, is a mineral with a past. The rare beauty of its pinks, blues, greens, yellows, reds, whites, and amethyst attracted the earliest man, and many specimens of prehistoric fluorspar "jewels" exist. Of recent years, a great deal of "hillock" spar has been marketed, some of the hillocks being the result of the lead-mining operations of the Romans, although the majority of hillock deposits are the work of "the old man," that romantic seeker of lead who has left his mark so plainly in the Derbyshire and Durham hills. The energy of these ancient lead miners was tremendous, and whole areas are covered by the hillocks of gravel that they extracted from their mines, and the ground is honeycombed with disused shafts. But the value of hillock fluorspar is on the wane. Many of the deposits have been combed for the second and third time, and without the installation of beneficiating plant, the cost of which would seldom be justified, further gleaning will be unprofitable. Consequently, we must look to the miner and to mechanical processing and refining for the bulk of our future supplies. Fluorspar is an elusive and erratic mineral, and in very few deposits indeed can it be found with virgin purity sufficient to satisfy the increasingly precise analyses of the consumer.

Abuses of the Past

Although it is impossible to divorce fluorspar from the romance of the past, ours is a material age, and except for the beautiful "Blue John" specimens, now unfortunately increasingly rare, the practical beauty of fluorspar is reserved for the metallurgist, the glassmaker, the chemist, the producer of ceramics, etc., who, now realising how much it contributes to the tractability of their

processes and to the ultimate efficiency of their products, are giving more and more attention to its proper use, and the death knell is sounding for the haphazard production methods that have for so long been tolerated.

As is to be expected when so many small prospectors are engaged in the independent exploitation of their deposits, plant and equipment is not well distributed or employed. It is distressing, from an economic point of view, to find several small producers, situated perhaps within the radius of a mile, each with a production of 50 to 100 tons per month, each with the need for plant and machinery to increase and improve output, but in no single instance, because of the small individual production, able to justify the installation of beneficiating plant. Often, too, this impecunious working of deposits results in bad and insufficient timbering, with subsequent subsidences which probably destroy for all time the possibility of further working. Where limited capital is employed there is also the temptation to rob a deposit of its richest lodes, and to spoil in so doing any chance of procuring the less pure material, for which, after refinement, there is a ready market. Our fluorspar deposits are part of the natural wealth of the nation, and as such their exploitation should be a matter for careful planning, and any short-term get-rich-quick policy must be avoided.

We have 34 producers of fluorspar; 17 are without jigs, 16 are without washing plant, and 19 without means of crushing. Lack of transport is also a problem with which many have to contend. Owing to the limited operations of some of the smaller producers, skilled labour is often uneconomically employed, and it is not unusual to find fully skilled miners doing the work of labourers, while at adjacent deposits efforts are being made to train labourers to do the work of the unprocurable skilled man.

Marketing

The marketing of fluorspar is a matter that has been sadly neglected, and—a strange reversal of normal business procedure—it would seem that there are more consumers looking for prospective producers of better and consistent spar, than there are producers looking for prospective buyers. The reason, in many cases, is that, with the small outputs involved, the cost of establishing efficient sales organisations would be out of proportion to the total turnover.

The nation has every reason to be proud of the war-time diligence of the British fluorspar producer. Pre-war production averaged 33,000 tons a year. War-time production has risen to something like 100,000 tons per annum, and all consumers' requirements have been satisfied. This is all the more commendable because of the undoubted apathy that has for years been sapping the vitality of the industry. The Derbyshire Fluorspar Producers' Association, which it is hoped will be extended to embrace Durham and Yorkshire producers, will no doubt take steps to ensure that apathy will not return. There are no fluorspar demands that cannot be met from home production, and there should be an exportable surplus substantial enough to establish Great Britain as one of the foremost fluorspar producers of the world. Our fluorspar deposits are very large, our miners and operatives are skilled in their tasks, and their experience is unequalled. Our mining engineers are of the best. Co-ordinate these talents, and the prestige of British fluorspar would be unchallenged; and it is to be hoped that this will be one of the first tasks that the Association will set itself.

Central Control

The author has been privileged to meet many of those responsible for our present production, and believes that their desire for progress will not be satisfied until they have given to posterity an industry governed by the soundest of principles. No industry is in a better position to co-ordinate its resources: production is confined to two comparatively small areas—Derbyshire and Yorkshire, and Durham. Central development, direction, and control would be, geographically, easy to apply, as also would be unified marketing; consequently, it is believed that a logical step will ultimately be the establishment of a fluorspar marketing board.

There would, of course, be difficulties attendant upon so radical a proposal, but no difficulties that could not be overcome by determination and the will to work together for the common good. The advantages would be numerous, and some of them at once apparent: the pooling of resources, plant, and equipment; the wise employment of transport and labour; the power that would result from the cumulative pooling of the industry's brains and experience in both mining and marketing. Waste of skilled labour would be eliminated, and no producer would be at the mercy of the unscrupulous buyer. Overhead costs, both operative and clerical, would be reduced. Has the Industry the courage to take such a step? We think so, and believe that, in taking it, the public and national interests would be well served.

To meet the needs of industry and commerce, and to assist them in the tasks of readjustment and recovery, said Mr. R. A. Butler at a conference of London Rotary Clubs, the Government intended to proceed with the development of technical education as quickly as possible—and not only as a long-term policy.

Personal Notes

MR. A. L. READ, B.Sc., chief research chemist of Sternol, Ltd., has been elected a Fellow of the Royal Institute of Chemistry.

MR. IAN FERGUSSON has been appointed chairman of Evans, Sons, Lescher & Webb, Ltd., in succession to the late Mr. J. Herbert E. Evans.

DR. JULIUS GRANT, M.Sc., F.I.C., has been appointed chief general manager of New Bury Paper Mills, Ltd., the subsidiary company of Thomas Owen & Co., Ltd.

MR. R. S. BICKLE, B.Sc., an explosives chemist in Government employment, has been elected chairman of the executive committee of the Association of Scientific Workers in succession to Mr. E. D. Swann.

The Pharmaceutical Society is awarding the Harrison Medal to DR. A. J. EWINS, and the Hanbury Medal to SIR HENRY DALE, president of the Royal Society and director of the Royal Institution.

PROFESSOR I. M. HEILBRON, F.R.S., has been awarded the Davy Medal of the Royal Society for his many notable contributions to organic chemistry, especially to the chemistry of natural products of physiological importance.

MR. C. A. BODMER, who has been on the staff of High Speed Steel Alloys, Ltd., Widnes, for 29 years, has been appointed to succeed the late Mr. J. L. F. Vogel as general manager. He graduated in metallurgy at the Manchester College of Technology.

MR. WILL MELLAND has been elected president of the National Smoke Abatement Society in succession to the late Dr. Des Voeux, and SIR LAWRENCE CHUBB has been elected hon. treasurer of the Society in place of Mr. Melland, who has held that position since the formation of the Society.

COLONEL J. V. RAMSDEN, C.M.G., D.S.O., Devonshire Baryta Co., Ltd., has been elected chairman, for the coming year, of the British Barytes Producers' Association, in succession to MR. D. J. W. ORR (Wrentnall Baryta Co., Ltd.) who continues in office as vice-chairman. MR. F. KEY (Hopton Mining Co., Ltd.) has been appointed hon. auditor.

Obituary

The death is announced of MR. PERCY HERBERT GREGORY, aged 77 years, of Brackley Road, Heaton Chapel, Manchester, who, until his retirement in 1929 at the age of 63, was the secretary of Messrs. James Woolley, Sons & Co., Ltd., wholesale druggists and chemists, of Victoria Bridge, Manchester. Mr. Gregory was a former president of the Chartered Institute of Secretaries.

New Control Orders

Iron and Steel

THE Control of Iron and Steel (No. 32) Order, 1943 (S. R. & O. 1943, No. 1530; price 4d.), came into force on November 3, and revokes and remakes in consolidation form the Control of Iron and Steel (Nos. 15-20, 22, 23, 26, 28 and 31) Orders, 1941-43. The Order also authorises a number of price changes, indicated in schedules, and includes the following new provisions:

(1) Extension of control to niobium and tantalum ores and all chemical compounds of molybdenum, tungsten, or vanadium (exclusive of catalysts or pigments).

(2) Permits stockholding merchants to prepare material supplied against an authorisation under the Distribution Scheme to the extent covered by that authorisation. In other cases stockholders may perform simple operations such as cutting and holing.

(3) Where a re-sale is made, at the request of the Minister of Supply, involving additional transport costs, he may authorise an addition to the maximum controlled price.

(4) Permits the purchase without authority of up to 2 rolls, not exceeding £3 in value, of used wire netting in any calendar month.

The following are the principal changes in the Schedule accompanying the Order: hard carbide finished tool tips, prices reduced; spiegeleisen and substitute high-speed steel, maximum prices established for the first time.

SHELLAC RESEARCH BUREAU

The London Shellac Research Bureau announces that although the Indian Lac Cess Committee has recently abolished the post of Special Officer Lac Inquiry, which was held by Mr. A. J. Gibson, F.C.H., F.L.S., and has reorganised the bureau under the acting directorship of Dr. B. S. Gidvani, F.I.C., A.M.I.Chem.E., its policy remains unaltered. The bureau and its laboratory will continue to render all possible assistance to the shellac-consuming industries as in the past. All confidences placed in the bureau will be respected, and secrecy in regard to any processes revealed to it maintained. The sole object of the bureau still remains the same, namely, to improve the existing uses and find further uses for lac, and the Lac Research Laboratory will continue to carry out research work with this object in view.

The bureau extends its co-operation to the shellac trade and industries, and trusts that there will be a reciprocal response. Free tchnical service and advice on problems connected with shellac will be available as heretofore. All inquiries may be addreseed to Dr. B. S. Gidvani, acting director, London Shellac Research Bureau, 79 Grassmarket, Edinburgh 1.

General News

From Week to Week

For filtering blood plasma a fine-weave nylon cloth, having 30,000 holes per square inch, has proved effective. Small bags made of nylon have been devised for filtering either plasma or whole blood during actual transfusions; they enable all clots to be removed, and are easy to sterilise.

Experimental distillation of the stem of *Myrrhis odorata*, the cicely plant which is native to Britain, is described in the *Pharmaceutical Journal* (1943, *151*, p. 173) by A. McCoubrey and H. S. Walker, who conclude that it might serve to meet the shortage of anise oil or as a source of anethole.

The Board of Trade have, with the approval of the Treasury, decided that in respect of the period beginning December 3, 1943, and ending March 2, 1944, the rate of premium payable under any policy under the Commodity Insurance Scheme shall be at the rate of 5s. per cent. for three months (or 1s. 8d. per cent. per month).

The latest industrial bulletin of the Ministry of Fuel and Power gives straightforward advice, which is attractively presented, on the economical consumption of lubricants and industrial oils. It emphasises the point that, where doubt exists about the possibility of reconditioning oil or about its conditions after treatment, a sample should be submitted for laboratory examination.

Applications on the part of workers in or about coal mines, or the children of such workers, are invited for a limited number of university scholarships for award in 1944. These scholarships are awarded through the Miners' Welfare National Scholarship Scheme (Ashley Court, Ashstead, Surrey), and applicants should not normally be less than 17 years old on January 25, 1944.

The Ministry of Food announces that under the provisions of the Soft Drinks Order, 1943, manufacturers of flavouring compounds are required to hold a licence, since a considerable range of such compounds is included in the definition of "soft drink," as laid down in the Order. The compounds referred to are those consisting of citric acid, colouring matter and preservative, together with essences or essential oils, and in some cases fruit juices which are used in the production of soft drinks and other foodstuffs. The Ministry is prepared to consider applications for licences from manufacturers of such compounds who were so engaged prior to May 1, 1942, and has circulated forms of application. Any such manufacturer who has not received a form should write to the Ministry of Food, St. John's College, Oxford.

The excessive use of ammonium sulphate is one of the reasons for the loss of soil fertility, states a memorandum submitted by the North Riding Executive of the National Farmers' Union to the National Council of that organisation. At a York meeting last week the memorandum was discussed, and one member said that so long as phosphate was unobtainable they were compelled to employ sulphate of ammonia.

Economy in the use of sacks is urged by the Ministry of Supply, which points out that the demand is enormously increased because of the requirements of the Services. To meet these demands quick turn-round is essential. The Ministry asks for the utmost care in handling sacks and suggests that economy slogans such as "Keep Me Clean" and "Return When Empty" be stencilled on all sacks, particularly new ones.

A conference on "London's Stake in Overseas Trade" is to be held by the London Liberal Party at Grosvenor House, Park Lane, on November 24. There will be four sessions, at 9.30 and 11 a.m., and 2.15 and 4 p.m., the respective chairmen being Lord Rea, Mr. Thomas Wiles, Lord Leverhulme, and Sir Percy Harris. Applications for tickets of admission should be addressed to the Secretary, London Liberal Party, 8 Gayfere Street, S.W.1.

An example of public advantage resulting from knowledgeable experimentation fostered by private enterprise was cited by Mr. William Paterson, chairman of the Paterson Engineering Company, at their annual meeting last week. By the application of a simple process, which they had initiated, to increase the efficiency and continuity of service of steam turbines, the saving in coal consumed at superpower stations had already exceeded a million tons.

The British Phosphate Commission, in response to requests from fertiliser manufacturers in Australia and New Zealand, as a result of the enemy occupation of Nauru and Ocean Islands, have employed their financial resources in the purchase (for resale in Australia and New Zealand) of phosphate in various parts of the world. According to the recently published *Report from the Committee of Trading Accounts*, no entry relating to these transactions was laid before Parliament, except for the commission charged to the fertiliser manufacturers for distribution, and the Committee recommends that the Treasury and Dominions Office should invite the Commission to consider whether the financial results of all its dealings should not be incorporated in the trading accounts.

The Derbyshire Fluorspar Producers' Association, at their executive meeting on November 8, elected the following officers to serve until March 31, 1944: Chairman, Mr. F. Franks (Ernest Hinchcliffe, Ltd.); deputy chairman, Mr. Charles A. Jones (Clay Cross Co., Ltd.); secretary, Mr. H. Hebblethwaite, 39 Foxwood Avenue, Sheffield 2.

The National Smoke Abatement Society last week held its first conference since the war began. Delegates of local authorities from all parts of Britain attended, as well as fuel and health experts. Proposals put forward to abolish the smoke problem included the suggestions that all new fuel-burning plant should be approved for smokelessness before installation, as is already required in the U.S.A., and that central areas of all large towns should be scheduled as smokeless zones, to be extended to cover the whole town under a "ten-year plan."

Foreign News

The annual capacity of the aluminium works at Sabiñanigo, Spain, has been increased to 2000 tons.

Fertiliser subsidies, totalling £20,000, have been paid out for farmers in Kenya this year.

The American Institute of Chemistry has changed its address to the Lincoln Building, 60 East 42nd Street, New York.

Exportation of Mexican tungsten ore containing 3 per cent. tungsten began in June, reports *Foreign Commerce Weekly.*

Danish foundries last year received only 18-20,000 tons of pig iron, compared with the normal supply of 50-60,000 tons.

Increased quinine production will result from the cultivation of cinchona trees by a number of new agricultural co-operatives in Peru.

A new company (Puukemia O/Y) has been established at Helsingfors, Finland, for the production of sulphite spirit according to the process of Dr. A. Wuorinen. Its annual output is to be 10 million litres.

Work on the new Brazilian National Steel plant at Volta Redonda is progressing so favourably that coke production will be started by January, 1944, and pig-iron and steel production by July, 1944.

The Japanese press claims that the output of ferro-alloys has been increased by 50 per cent. in the past year. Specific production increases announced by the Ferro-Alloy Council are 200 per cent. for ferro-chrome, and 20 per cent. for ferro-manganese.

American production of aluminium forgings is 45 times larger this year than in 1939, according to Mr. A. H. Bunker, director of the aluminium and magnesium division of the War Production Board, states a Reuter report.

A substitute for carborundum, needed for making millstones, is being made on an experimental scale in Costa Rica by fusing quartz with a mixture of magnesia and magnesium chloride.

A shortage of silver for the national currency is threatened in Mexico, one of the world's largest producers of that metal. This state of affairs has arisen in spite of a decline in crude-silver exports.

Sodium propionate is being used in Canada under the name "Mycoban" for the prevention of mildew formation in bread bakeries 2-3 oz. are required for every 100 loaves of bread.

A new company called Sedem has been founded in Rumania, under German partnership and with a share capital of 12,000,000 lei. It will undertake geological and mining studies, and the smelting of ores.

Two state-controlled sugar refineries are being erected in Croatia, which up to now has possessed only one sugar factory, situated at Esseg, and with an annual capacity of 1800 waggons.

The Japanese radio has announced the discovery of a zircon deposit during experimental drilling at the Manahata gold mine in the Fukushina perfecture It is said to contain a high percentage of recoverable zircon.

Mount Isa Mines, North Queensland, which have been concentrating on copper production, have been asked to revert to the production of zinc and lead from January next, because of alterations in the Australian Commonwealth's munitions programme.

Production of caustic soda, at the rate of 3 tons a day, has been started in Mexico City, by the Alkali Electrolyse y Productos Quimicos Mexicanos S.A., which will also produce potassium chlorate, copper sulphate and calcium arsenate.

Output of 100-octane aviation spirit in the United States will be doubled in the next twelve months, according to a statement of Mr. H. Ickes, reported by Reuter. Twenty-six new refineries will begin operations between now and next spring.

The Colonial Office has accepted the Trinidad sugar industry's claim to State aid. In making this announcement, Sir Bede Clifford, Governor of Trinidad, also stated that general agreement had been reached on a post-war development programme for the island.

The import into Jamaica of ethyl, methyl, or propyl alcohol, whether denatured or not, exceeding 50 per cent. of alcohol by weight (except alcohol contained in any tincture contained in the British or U.S. Pharmacopœia or in any perfume) is prohibited except in accordance with a permit from the Collector-General of Customs.

Forthcoming Events

The South Yorkshire section of the **Royal Institute of Chemistry** meets on **November 13,** at 2.30 p.m., in the premises of the Sheffield Metallurgical Association, 198 West Street, Sheffield, to hear a lecture by Professor E. J. Wayne, on "Patent Medicines."

Dr. O. P. Einerl, M.I.M., will lecture on "Present and Future Applications of Light Alloys" to the **Association of Austrian Engineers, Chemists and Scientific Workers,** on **November 15,** at 7.15 p.m. The meeting will be held at the Institution of Structural Engineers, 11 Upper Belgrave Street, W.1.

At a joint meeting of the **Society of Chemical Industry** and the **Royal Institute of Chemistry,** Edinburgh and East of Scotland sections, to be held in the Medical Chemistry Lecture Theatre, Teviot Place, Edinburgh, on **November 16,** at 7 p.m. Professor M. Polanyi will lecture on "The Strength of Carbon Bonds."

An industrial safety conference is being held at the Council House, Birmingham, on **November 16** from 10 a.m. to 6 p.m., by the **Birmingham and District Industrial Committee** of the Royal Society for the Prevention of Accidents. The Joint Parliamentary Secretary for the Ministry of Labour and National Service will open the conference. Speakers include H.M. Chief Inspector of Factories, Sir Wilfrid Garrett, on "The Future of Accident Prevention," and Dr. J. M. Davidson on "Chemical Hazards, New and Old." Application for attendance should be made to the committee's hon. secretary, Mr. G. M. Hopps, c/o Bakelite Ltd., Redfern Road, Tyseley, Birmingham 11.

A lecture on "Wave-mechanics and Colour of Organic Compounds" will be given by Mr. E. J. Bowen, F.R.S., to the **Chemical Society** on **November 18,** at 2.30 p.m. The meeting will be held at Burlington House.

The Graduates' and Students' section of the **Institution of Chemical Engineers** will hold a meeting at Caxton Hall, Westminster, on **November 19,** at 6 p.m. A paper on British Power Resources will be delivered by Mr. A. Buirski.

Dr. E. Sutherland is giving a paper on "Drying Oil Polymerisation, 1930-42," at a meeting of the London section of the **Oil and Colour Chemists' Association,** to be held at the Charing Cross Hotel, London, at 6 p.m. on **November 19.**

Professor J. C. Drummond, scientific adviser to the Ministry of Food, is giving a series of four lectures to the **Royal Institution.** The first of these lectures will be on **November 23,** at 5.15 p.m., and the others are arranged to take place on the three following Tuesdays at the same time. In order of their presentation the titles of the talks will be "Food Production," "Food Research," "Food Technology" and "Food Education."

At the **Royal Institution,** on **November 26,** at 5 p.m., the chairman of the Food Investigation Board, Sir Joseph Barcroft, C.B.E, F.R.S., will lecture on "The Preservation of Foods by Drying."

At the meeting of the **Textile Institute** (Midlands section) at the College of Art and Technology, Leicester, on **November 27,** at 3 p.m., a joint lecture by Dr. C. M. Blow, A.I.C., and Mr. W. Knight, A.I.R.I., on "Textile Fibres and Rubber as Associated Materials for Manufacture," will be delivered.

Commercial Intelligence

The following are taken from printed reports, but w cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

NEW PROCESS WELDERS, LTD., Southall. (M., 13/11/43.)—October 20, mortgage to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on contract moneys. *£3,600. September 12, 1942.

Company News

Johnson & Sons, Manufacturing Chemists, Ltd., report a profit for 1942 of £5509; to interim dividend on ordinary "A" and "B," £1521; to preference dividend, £1200.

Unchanged interim dividends are being paid by **United Molasses Co., Ltd.** (7½ per cent.), **British Match Corporation, Ltd.** (2¾ per cent.), **B. Laporte, Ltd.** (5 per cent.), and **Borax Consolidated, Ltd.** (3 per cent.).

Kolok Manufacturing Co., Ltd., announce a trading profit of £69,310 (£50,440) for the year ended August 31, and are paying a final deferred dividend of 80 per cent., making 120 per cent. (same).

South African Torbanite Mining and Refining, Ltd., announce a net profit, for the year ended June 25, of £57,453 (£70,455). The tax charge is increased from £3000 to £15,000

The Anglo-French Phosphate Co., Ltd., report a trading and investment income for the year to December 31, 1942, of £14,788, to which is added £18,638 from the company's participation in phosphate undertakings for the year 1939. Ordinary dividend, 7½ per cent. (nil); forward £28,961 (£24,972).

Chemical and Allied Stocks and Shares

UNCERTAINTY as to the position during the eventual change-over to peacetime working continued to have a much stronger influence on sentiment in Stock Exchange markets than the excellent trend of the war news. There was again little selling, however, though in most sections prices were inclined to move slightly lower in the absence of improvement in demand. The better tendency in British Funds was not maintained, and, where changed, industrial shares reflected the trend to lower levels.

Borax Consolidated, after recovering to 36s., went back to 35s. 6d., which compares with 36s. 3d. a week ago. Imperial Chemical at 37s. 9d. were unchanged on balance, but the 7 per cent. preference units improved slightly to 34s. 9d. Lever & Unilever at 36s. 6d. were the same as a week ago; Lever N.V. moved back from 34s. 4½d. to 33s. 9d. On the other hand, following their recent reaction, Triplex Glass 10s. ordinary rallied to 38s. a recovery of 2s. 6d. on balance. Elsewhere, Ceilon 5s. ordinary changed hands up to 23s. 3d., aided by the maintenance of the interim dividend at 10 per cent. At the time of writing, Dunlop Rubber have remained a relatively steady feature at 39s. 3d. On the other hand, Murex continued under the influence of the chairman's annual statement and reacted further to 93s. 9d., but later rallied to 95s.; as in most other instances, sentiment was influenced mainly by the small demand in evidence, and little selling was reported. Wall Paper Manufacturers deferred units moved back from 40s. to 37s. owing to the chairman's warning regarding export markets and that resumption of manufacture depends on Government decisions as to the release of paper and paper-making materials. Elsewhere, British Oxygen declined from 76s. 6d. to 75s., and British Match from 39s. 4½d. to 38s. 9d. At 47s. British Aluminium were well maintained.

Awaiting the financial results, British Celanese showed fluctuations; nevertheless, they were higher on balance at 31s. compared with 30s. 7½d. a week ago. Courtaulds were 9d. down at 51s., and Bradford Dyers were 20s. 9d. compared with 21s. There was a further decline from 76s. 3d. to 74s. 9d. in Turner & Newall. At 80s. the quotation for B. Laporte was the same as a week ago, while W. J. Bush were again 60s. Dealings up to 21s. were shown in Burt Boulton. Shares of companies connected with plastics reflected the reactionary trend of markets. De La Rue were 166s. 3d. compared with 170s. a week ago, while at the time of writing British Industrial 2s. shares have moved back to 6s. 9d., and Erinoid to 10s. 6d. The units of the Distillers Co. were 87s. 6d., a decline of 1s. United Molasses improved from 30s. 9d. to 31s. 3d.

Following their recent decline, Dorman Long rallied, and were 28s. 3d. compared with 27s. 9d. a week ago. On the other hand, Stewarts & Lloyds eased from 51s. 9d. to 51s. 3d., Tube Investments from 92s. 6d. to 91s., and Thomas Firth & John Brown remained at the lower level of 63s. 9d. current a week ago. Staveley ordinary improved to 52s. 3d., and United Steel strengthened to 25s. 4½d. Awaiting the financial results, Imperial Smelting have remained at 15s. 3d. at the time of writing. Allied Ironfounders were little changed at 48s. 3d.; in this case the interim dividend is due shortly. A decline of 6d. to 28s. 6d. was shown in British Plaster Board. Associated Cement were 61s. compared with 62s. 6d. a week ago.

A reaction from 42s. 3d. to 41s. 3d. was shown in Boots Drug, while Sangers were 23s. 6d. compared with 23s. 10½d., and Timothy Whites 33s. 3d. compared with 33s. 6d. In other directions, General Refractories eased to 15s. 7½d. Greeff-Chemicals 5s. ordinary were again quoted at 7s. 9d., and Monsanto Chemicals 5½ per cent. preference at 23s. 6d., while Morgan Crucible first preference changed hands up to 27s. 6d. Major & Co.'s ordinary marked 3s. at one time. British Lead Mills 2s. ordinary transferred at close on 4s., British Emulsifiers at 3s. 3d., British Tar Products 5s. ordinary at close on 10s., and British Thermostat around 19s. 6d. Fluctuations were shown in leading oil shares, which, however, were mostly better on balance.

British Chemical Prices

Market Reports

A STEADY movement has been reported in almost all sections of the London chemical market during the past week, with contract deliveries to home users occupying the main attention. Export inquiry has been good and actual bookings are reported to be on a better scale. The price position generally shows little change of importance and quoted rates remain at recent levels. A tight supply position continues to be the chief feature in the soda products and potash

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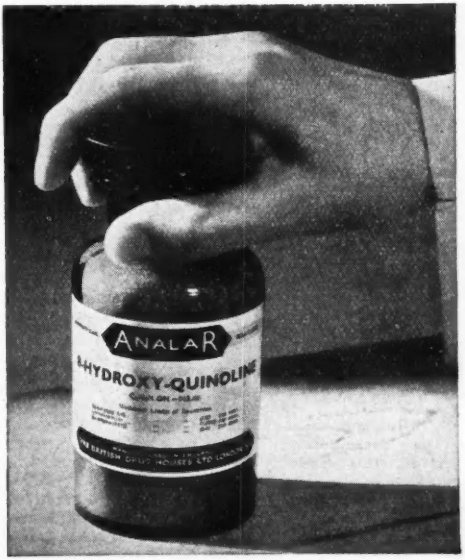

products sections. Offers of tartaric and citric acids are finding a ready market and supplies of acetic acid continue to be restricted to priority needs. There has been no change in the quoted rates for the lead oxides, while formaldehyde and acetone continue to receive a steady demand. In the coal-tar products market the demand is steady, activity being restricted by a short supply position and the many control measures now in operation. Pitch is firm.

MANCHESTER.—Quotations maintain a firm front in virtually all sections of the chemical market and, although during the past week there has been little in the way of actual change, there is a noticeably strong tendency in several directions. Fair quantities of a wide range of products are being absorbed by the cotton and woollen textile trades, while for the most part steady deliveries of the alkalis and other materials are being made under contracts. Fresh inquiry and new business during the week has been on moderate lines. Pyridines are on the quiet side, but other descriptions of tar products, both light and heavy, are moving steadily into consumption at a firm range of prices.

GLASGOW.—In the Scottish heavy chemical trade there is no actual change during the past week, home business remaining steady. Export trade continues rather limited. Prices keep firm.

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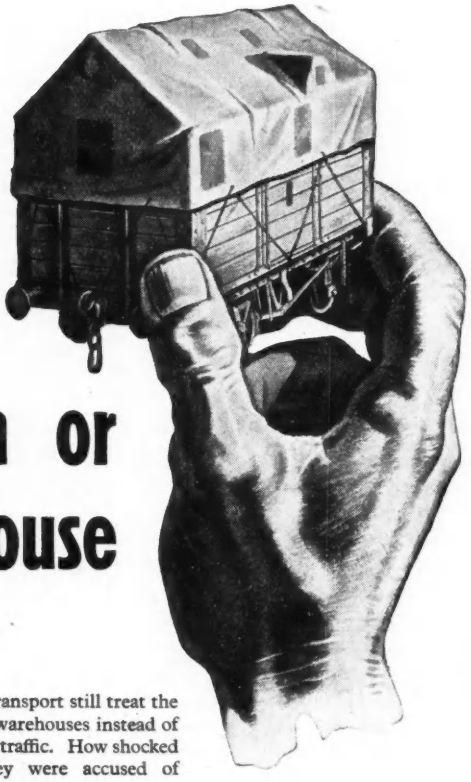

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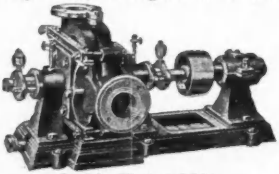

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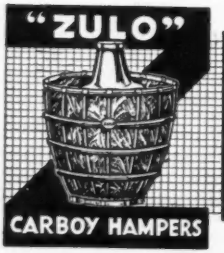

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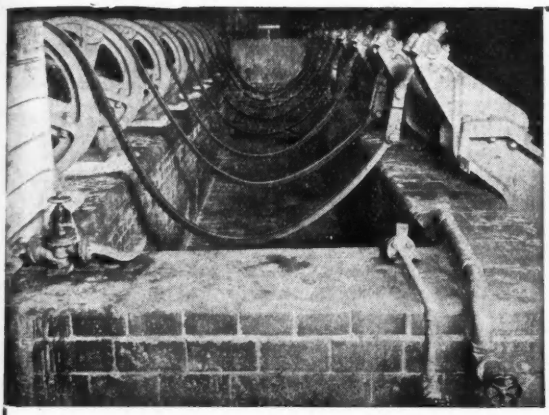

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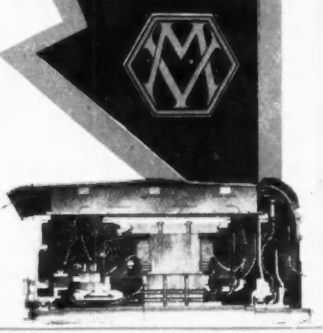

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Printed in Great Britain by THE PRESS AT COOMBELANDS., London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4., November 13th, 1943. Entered as Second Class Matter at the New York, U.S.A., Post Office.

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